tached with difficulty. The air-plate all over the surface must thus become continually renewed and the arrangement kept perfect.

Sensible respiration is not at all essential to the repelling power of leaves; the most beautiful manifestation of it I have met with is in the *Pestia*, a little floating water-plant abounding in our shallow tanks, and resembling common endive. When pushed under the surface, it looks like a little mass of burning silver. The same appearance is presented on cabbages, young clover, and a vast variety of other leaves; it is the cause of the bright pearl-lustre of dew. The same phenomenon is manifested on the wings and backs of divers when they dash into the water. In this case it has been ascribed, most erroneously as I believe, to the presence of grease or oil in the feathers, and is, I have no doubt, due to the presence of an air-plate repelling the water, so that it never comes in contact with the feathers at all. The trimming process, so carefully performed by Water Fowl, is probably an application of oil or grease, with the object of separating or dressing the little fibres of the feathers so as to produce an arrangement fitted to entangle the air. The reflexion of light from the lower surface of the water is the proof of want of contact. A piece of polished marble or of glass, a waxed, oiled or greased surface, readily throws off the water without remaining wetted; but no reflexion is in this case observable.

Might not the manufacturers of waterproof cloth or clothes take a hint on this point from the economy of nature? Could they manage to produce a surface such as would entangle and retain a film of air, no india-rubber varnish or other water-tight material would be required, while the texture would permit the free transmission of respiration or moisture from the body, which Mackintosh's and other similar contrivances obstruct.

BOTANICAL SOCIETY OF EDINBURGH.

May 14, 1857.—Professor Balfour, Vice-President, in the Chair.

The following papers were read:—

1. "Notice of two cases of Poisoning with the seeds of *Thevetia nereifolia*," communicated, with remarks, by Dr. Douglas Maclagan.

The history of these cases, which occurred in India, was furnished by Dr. John Balfour, H.E.I.C.S. The symptoms were narcotico-irritant, the irritant character predominating, and the somnolence and other cerebral phænomena being, in Dr. Maclagan's opinion, probably as much those of exhaustion as of true narcotism. There was vomiting of a peculiar character. *Thevetia nereifolia*, Juss. (*Cerbera Thevetia*, L.), now naturalized in India, appears to have been introduced probably from South America.

2. "Account of the Insect which infests the seeds of *Picea nobilis*," by Andrew Murray, Esq., F.R.S.E.

The *Picea nobilis* was first introduced into this country from the north-west of America by Douglas in 1831. No second importation

of seed was made in any quantity till Jeffrey sent home some packages in 1852. These proved all bad, and apparently had suffered from the ravages of an insect. Mr. Beardsley and my brother next sent a quantity in 1854, and I noticed the fact that in almost every cone of *P. nobilis*, the seeds were being eaten by a small caterpillar. My brother had found these caterpillars in the green as well as in the mature cone, their eggs evidently having been deposited in the kernel while the cone was yet soft and easily penetrated. One or two subsequent importations of seed proved to be also to a greater or less extent infested by an insect. I have bred the insect, and find that it belongs to the genus *Megastigmus*, one of the Chalcidites. Out of hundreds of insects which I have seen developed from the cones of *Picea nobilis*, I never saw any other species, except one small moth. In the April Number of the 'Zoologist,' Mr. Parfitt has named the insect *Megastigmus Pini*. He has described only the female, not having seen the male. I obtained specimens of both, which I have placed in the British Museum. The male is smaller than the female, and differs in having its upper surface entirely black. The immense quantities in which the insect has been found in the cones, at least in all the later importations, and the fact that the early stage in which the cone is attacked renders protection or prevention by man nearly impossible, are likely, I fear, to keep this pine always comparatively scarce.

3. "On the supposed influence of the Moon on Vegetation, in Peru," by Archibald Smith, M.D.

The author thought it not unreasonable that the lunar ray might have a peculiar chemical agency on the functions of plants and animals, as it appears to have on dead animal matter. It must be borne in mind that the light afforded both by the sun and moon in Peru is much greater than in the British Islands,—so that, although we may reasonably repudiate any marked effect from the moonlight in these islands, the more intense lunar light of Peru may exercise a sensible power on plants. The author alluded particularly to the surprisingly rapid growth of lucern, which is extensively cultivated in Peru, and is evidently much favoured by light, whether of sun, or sun and moon together. During the prevailing misty season on the coast (which is the time when the low and maritime sand-hills are garnished with grass and flowers to their summits) the growth of lucern in the plains and valleys is greatly stinted. In these wet months, as they are called, though the rain very rarely forms into a light shower, or exceeds the limits of a dripping mist, the clover or lucern does not attain to a flowering maturity; but no sooner do the vapours of the coast begin to break up, and the sun show itself in a brightening sky, than this useful plant receives a fresh impulse, yielding two or three luxuriant crops in succession. This remarkable vigour of vegetation under the influence of a returning sun, argues on behalf of light, more than of heat. Besides, in the temperate valleys of the Sierra, where the summer temperature of the air does not exceed the winter temperature of the coast, the lucern grows luxuriantly

under a bright clear sky during the dry season, though there also its growth is checked in the cloudy and rainy months; and yet the sunny season of the mountains is subject to night chills, or even frost at certain elevations, whereas the wet months are not so. Light, therefore, seems the essential condition to the recurrence of the more luxuriant vegetation, as observed in the successive climates of the Andes.

4. "On some of the leading Plants of the lowest zone in Teneriffe," by Professor J. Piazzi Smyth.

The author described the manner and characteristics of growth of the chief plants as met with advancing from the sea-coast inland, and found both the indigenous and cultivated plants to exhibit a poverty of growth as compared with many other lands in the same latitude (28°). The cause of this, he thought, was owing to the special predominance of the trade-wind throughout the archipelago of the Canaries during the whole of the summer season, and to the want of rain, and the low temperature which that wind produces, both primarily and secondarily. The author treated at length on the *Dracæna Draco* as being, *par excellence*, the characteristic plant of the lowest zone of Teneriffe.

June 11, 1857.—Professor Fleming, President, in the Chair.

The following papers were read:—

1. "On the Identity of *Achorion Schönleini*, and other vegetable parasites, with *Aspergillus glaucus*," by Mr. John Lowe.

The object of this communication was to show the relation which exists between the parasitic growth in *Porrigo favosa* and other skin-diseases, and a common species of fungus, *Aspergillus glaucus*, and to establish the identity of a number of these forms which have hitherto been regarded as specifically distinct. A quantity of favus crust having been procured from a case of *Porrigo lupinosa*, a portion was immersed in pure glycerine, another was placed on cheese, and a third in a solution of raw sugar. The first did not germinate, but became disintegrated after about ten days. This was probably owing to the temperature of the fluid not being sufficiently high, as it is well known that the yeast-plant grows with facility in the same medium, at an elevated temperature, during the manufacture of butyric acid. The cells placed on cheese also failed to germinate, and died in about the same time as those put into glycerine. Those immersed in the saccharine solution gave a different result. At the end of forty-eight hours the cells had become swollen and more oval than at first; on the day following, they began to unite into moniliform chains forming a mycelium, the filaments of which after a time were observed to contain granules and nucules. At the end of about a month, the perfect fructification of *Aspergillus glaucus* appeared. During the growth of the plant, the different stages of development were observed daily, under the microscope, and the whole of the following *species* (*so-called*) were found accurately represented, so far as appearance goes, by one or other of the forms produced: *Micro-*

sporon furfur, Robin; *Oidium albicans*, Ch. R.; *Torula guttata*; *Trichophyton toneurans*, Malmsten; *T. ulcerum*, Ch. R.; *Microsporon Audouini*, Ch. R.; *M. Mentagrophytes*, Ch. R.; *Achorion Schönleini*, Remak.; *Leptomitus*, six species; with a considerable number of other epizootic forms. With regard to the majority of these, the author remarked that they could not be with certainty considered as identical with *Aspergillus*, but that there was every probability of such being the case,—1st, from the exact identity of form; and 2ndly, from the extreme unlikelihood of their being distinct species, as shown by their never or rarely producing fruit; proving them to be mere variations of some other fungus growing under unfavourable circumstances, and not arriving at a perfect development. With *Achorion Schönleini* the case is different. The following facts may be adduced in support of its alleged identity with *Aspergillus*:—1st. The sporules of the former, carefully watched during their growth, developed the perfect sporangia of the latter, which, 2ndly, is produced in a state of fructification in the air-sacs of birds,—showing the possibility of its growing on animal tissues. 3. The figure given by Dr. Bennett of a section of the scalp affected by favus, exhibits the true fructification of an *Aspergillus*.

2. "On the Properties of *Lolium temulentum*," by Mr. John Lowe.

After noticing the physiological effects which have been ascribed to the action of Darnel, the author remarked that there exists a great want of information as to the amount of the seed requisite to produce these results. From all that has been written on the subject, it would appear as if the virulence of the herb varied in different localities. A series of experiments was given in detail, showing that Darnel grown in the Botanic Garden produced no effect when taken in doses of half an ounce. The observations of Professor Christison on the *Œnanthe crocata* show an analogous result, this plant being a virulent poison when grown in England, but innocuous in Scotland. A similar example is seen in the *Cannabis indica*, which only yields its gum-resin when grown in a hot climate. Further experiments are required with regard to *Lolium*.

3. "Further Observations on Dust-showers," by Mr. George Lawson, F.R.P.S.

Mr. Lawson laid before the Society a letter from Dr. J. O. M'William, R.N., in which that gentleman remarks: "While I was at Boa Vista, the easternmost of the Cape de Verd group, during the months of April, May, June, and part of July, 1846, I had ample opportunity of witnessing these phænomena. In my meteorological register I find that in April [1846] the atmosphere is recorded as hazy, and filled with sand, ten days; in May, eleven days; in June, five days; and during the first ten days of July, three days. As a general rule, when these sand-fogs prevailed, the north-east trade-winds were blowing with more than usual force; they sometimes lasted for three or four days without any intermission. At the period of their prevalence, the sand-heaps which abound in this barren, parched, volcanic region are drifted about from the windward to the leeward side

of the island, filling the hollows in the plains, and sometimes, in the course of a few hours, obliterating all traces of pathways, and thus bewildering the newly-arrived traveller. I was in the leeward side of the island when the first sand-shower occurred, and the residents differed in opinion as to its source, some saying that it came from the beach and sand-hills on the windward side of the island; while others, more correctly, as I consider, attributed its origin to the African Desert. I had soon an opportunity of ascertaining that they did not originate on the island itself, for I witnessed a sand-shower of considerable density over the sea *to windward of the island, between which and the African coast no land intervened*; and I therefore came to the conclusion that that coast was its source."

4. "Analogy between the serial arrangements of the Leaves of Plants and Crystalline Forms," by Mr. William Mitchell.

MISCELLANEOUS.

On the Causes of the Opening and Closing of Stomates.
By Hugo von Mohl.

In this memoir Von Mohl corroborates by actual experiments the general impression, the truth of which had not been demonstrated, that stomates shut when the guardian-cells collapse, and open when they become turgid.

The opening of the stomate is guarded by two crescent-shaped cells, the guardian-cells, which generally take the following form. On their external surface each bears a cuticular projection, which is usually formed by a thin membrane; in other cases, however, it consists of the cell-wall considerably thickened, or the cell-wall is sometimes even thick enough to form a salient protuberance. The edges of these projections unite at both ends of the stomate, so as to make an orifice above the true opening of the stomate; this orifice may be wider or narrower than the true opening. It leads into a continuation of the true opening, filled with air, and lying above the opening; this Von Mohl calls the anterior cavity, or antechamber (*Vorhof*), and the opening, the orifice of the antechamber. It is bounded on both of its lower sides by the upper part of the lateral surfaces of the guardian-cells, these surfaces being concave horizontally and convex vertically. Turned towards the stomatic cavity, on the lower side of the guardian-cells, there lies in most plants another projection like that on the upper side, but generally smaller, by which a posterior cavity, corresponding to the anterior cavity, is separated from the cavity of the stomate.

A transverse section usually shows that the thickness of the walls of the guardian-cells is very unequal in different places; the part of the wall contiguous to the epidermal cells is generally rather thin, so that these cells must prevent the guardian-cells from swelling out at this par-